

Delegation to Study Water Pollution Control in Iron & Steel Industry

<u>DELEGATES:</u>	Mr. A. Paretti	- Delegation Chairman - EPA, Consultant, Water Program Operation
	Ms. P. W. Diercks	- EPA Chemical Engineer, Effluent Guidelines
	Mr. K. A. Brown	- United States Steel Corporation, Chief Staff Engineer, Air and Stream Pollution Control
	Mr. L. Boehm	- Armco Steel Corporation - Manager, Armco Environmental Engineering
	Mr. J. R. Suitlas	- National Steel Corporation - Manager, Environmental Control Research

I. GENERAL

The delegation was in the Soviet Union during the period May 17 through May 31, 1975. Conferences were held at the Ministry of Iron and Steel, at the Institute "VNIPI Chernetenergoochistka" in Kharkov, and visitations were made to four (4) integrated steel plants with one or more processes and related water pollution control facilities being visited and discussed at each plant.

Among the many impressions gained by the delegation, the following are significant:

1. It was clearly evident that the Soviets have made substantial investments in water pollution control facilities, at least at the locations which were visited. Similar systems were said either to exist or to be planned or under construction at other steel plants.

Further descriptive information on each plant visited is in Section III of this report, and the process and pollution control facilities which were exhibited to the delegation are listed on Attachment No. 3.

2. Water standards applicable to most locations are for stream quality (see attachment No. 1) and have been set by the Water Control and Health Ministry at a level which the Iron and Steel technicians feel precludes any process water discharge.

2. (Continued)

A majority of our technical discussions, accordingly, concerned closed recycle systems and how the Soviets expect to apply this concept to process units and/or to total plants.

Several existing treatment systems which were exhibited to the delegation were initially suggested as being capable of operating without discharge. It was usually developed, after further inquiry, that there actually was a blowdown to a lower quality system, or to a lagoon shared with other recycle systems -- from which there was ultimately discharge from the system.

All the Soviets with whom this problem was discussed clearly understood the necessity of controlling dissolved solids buildup in recycle systems. The nature of their questions posed to the U.S. delegation often indicated the seriousness of this problem in their systems. No method of control other than blowdown was suggested and this method was clearly in use, as indicated above. The Soviets, nevertheless, seemed generally convinced that by cascading blowdown from system to system, some magic could be made to occur and the combined systems could have no blowdown. Only in discussions at the Institute in Kharkov (VNIPI, etc.) where water systems research and design are carried out did the staff acknowledge that it might be necessary to resort to energy intensive evaporation techniques to actually effect zero discharge.

Further, in this regard, it was indicated at the Institute that three (3) plants were being selected for design and installation of zero discharge systems.

3. The delegation saw no evidence to suggest that the Soviets are using, or are close to using, any water pollution control technology more advanced than that used in the USA. Contrarily, such common devices as high rate filters are apparently not yet being used there. It also appeared that they were unfamiliar with, and unable to comprehend, certain sludge concentration techniques which are in relatively common use in the USA. Moreover, the plants visited were littered with abandoned cooling towers of all descriptions, many of which were acknowledged to have been found to be superfluous to the systems in which installed, suggesting a previous lack of technical know-how at a very basic level.

One very elaborate installation for continuous kiln drying and pelletizing of sludge from the vacuum filters at a new BOF converter plant was, however, exhibited and indicated to be a prototype of others to come. It was said that the dried pellets were 100% recycled to the sinter plant without further processing. It was indicated that the sludge was free of zinc or other materials the presence of which generally precludes recycling of sludge from domestic converters.

4. Although technically beyond the scope of the delegation, some observations were also made concerning air pollution control techniques employed at the specific locations visited. Although many of the water systems discussed were actually associated with modern wet gas cleaning installations, the delegation was able to observe inadequately controlled and/or uncontrolled open hearth furnaces. Also, coke battery stack discharges were generally black and there were acknowledged to be no controls being applied to fugitive emissions from coke, iron or steel making operations generally.
5. From the outset the Soviets were determined to generate a Protocol or Memorandum of the meetings including the documentation of areas of future cooperation. Such an instrument was drawn up and signed (See attachment No. 2). A list of problems in which the Soviets are interested is appended for review and further consideration by the USA.

See Section II-B of this report for the U.S. delegates further comments regarding a future program.

6. It is the unanimous opinion of the delegation that the Soviet group made every effort to discuss the subjects of the various meetings frankly, openly and completely. Elaborate attempts were made to clarify any points of confusion or misunderstanding. Additionally, some efforts were made to oblige special requests such as the viewing of plant outfalls at 2 locations and the inspection of a coke dry quenching installation at Novo Kuznetsk.

Additionally, both the Ministry and the plants visited were more than generous in their hospitality to the delegation, including such unexpected gestures as hosting a Sunday holiday at a beach resort belonging to one plant and the Ministry paying substantial overweight baggage charges which Aeroflot assessed on returning U.S. delegates.

II. RECOMMENDATION  
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A. Concerning future delegation visits to the Soviet.

The industry delegates recommend that EPA should consider two (2) matters which they believe would enable future delegations to function more effectively:

1. Additional Orientation prior to departure by appropriate EPA or other government representatives.

Members of this delegation received no written, and but little verbal background information concerning either the nature of the May 1972 Cooperation Agreement or the function, charge objective or responsibilities of the delegation. To proceed into meetings with foreign delegates on such a casual basis risks technical and/or diplomatic embarrassment. Certainly, the direct cost to the two governments and the indirect cost to industry of such an expedition is great enough to merit either preparation of written orientation material or a formal delegate briefing preceding the expedition.

2. Inclusion of a U.S. Interpreter in the delegation

No interpreter accompanied this delegation. Services provided by the Soviet government varied from none at all at off-duty times and on those occasions when their interpreter had to be elsewhere, to barely adequate at many meetings when a single interpreter had to deal with large groups.

Again, the investment in the expedition should merit inclusion of a full time U.S. interpreter to assist the delegation at all times.

B. Concerning furthering the program of cooperation in the field of water pollution control in the Iron & Steel industry.

1. Precaution

Preliminary discussion indicates two (2) specific areas of Soviet activity which could possibly contribute useful information (see II-B-2). However, it should be recognized that any near-term technological benefit of extended exchange either in those two areas or along the lines tentatively suggested by the Soviet will likely be to the Soviet side.

This is not intended to dissuade continued cooperation. Extended investment and activity by the Soviet Iron and Steel Ministry in the environmental field, including utilization of any U.S. technology which we can introduce to them, would not appear to be alien to the interest of either the U.S. Iron and Steel Industry or the U.S. Government.

II. RECOMMENDATIONS (continued)

B. 1. (Continued)

To proceed further in the hope of significantly advancing environmental progress in the United States Steel industry would, however, be folly.

2. Areas of possible interest to U.S.

The Soviets indicated their intent to proceed with an attempt to eliminate discharge at three locations now being selected. Certain U.S. steel plants are committed to very stringent reduction in discharge programs. Further exchange of technical status as these programs progress could be of mutual benefit.

Also, the Soviets, as previously indicated, claim to be doing extensive work in the reclamation and utilization of metallurgical sludges. A future symposium on this subject could be of mutual interest.

A. May 19, 1975 Iron and Steel Ministry

Delegates met with:

V. I. Petrikeyev	- Head of Power Services and Organizations Administration, Ministry
A. P. Yegorichev	- Chief Engineer of same
A. A. Dello	- Chief of Department of Foreign Relations, Ministry
T. V. Shulepnikova (Ms)	- Chief of Protocol Department of Foreign Relations Department
B. N. Maximov	- Sr. Engineer - Power Services, etc., Ministry
V. O. Shevchuk	- Chief of Designing Department on Water Purification Problems, Institute "VNIPI-Chermetenergoochistka"

Official meetings and introductions exchanged.

Proposed program was outlined by Soviets and some background given for each plant to be visited.

Soviets outlined their desire to arrive at a "program of cooperation" after delegation returned to Moscow.

Mr. Shevchuk from "Institute" outlined Soviet state of the art in Steel Mill Water Pollution Control.

In response to Soviet questions, USA delegates discussed difficulties imposed by contradictory state and federal regulatory jurisdictions.

Also mentioned difficulties entailed in sludge disposal.

B. May 20, 1975 - Novo-Lipetsk Plant

S. V. Kolpakov	- Plant Director
R. M. Grizlin	- Chief Energy Engineer
B. N. Maximov	
V. O. Shevchuk	
Ms. T. V. Shulepnikova	
U.S. Delegates	

B. May 20, 1975 - Novo-Lipetsk Plant (continued)

Orientation and description of plant water system given in meeting at plant conference room.

Lipetsk is integrated plant including:

Sinter Plant =	12 MM Annual Tons
Coke Plant =	4 MM Annual Tons
(5) Blast Furnaces =	7 MM Annual Tons
Electric Furnace Shop	N.A.
#1 BOF	4 MM Annual Tons
#2 BOF - Present	4 MM Annual Tons
- Future	8 MM Annual Tons
2000 MM Hot Strip Mill	N.A.

Plant has an advanced water system including total of 180 Hectares of lagoons, impounding 4,500,000 cu. meters of water, with extensive re-use and recycle.

Visited, first, the main intake pump house, after a boat ride across recreational lake, and then rode via bus around the dike system separating the lagoons.

Visited coke plant biological treatment plant where WAL and other coke plant wastes are treated for oil and tar removal, sedimentation and bio-oxidation prior to disposal to quench. System was put in operation in 1969. Capacity of facility was indicated to be 220 meters<sup>3</sup> per hour.

Visited 200 MM Hot Strip Mill and inspected 104 cell sedimentation and oil removal system which followed primary scale pit. Related recycle system included natural draft cooling tower which is not in use at this time. Water quality out of sedimentation system was indicated as being 60 to 80 mg/l total suspended solids.

Visited sludge treatment plant for new 2 at 300 ton vessel BOF shop which had O.G. system with venturi scrubbers. Sludge was being treated via radial thickeners and vacuum filtered prior to being conveyed into kiln dryers at 900°C where sludge is dried and pelletized for return to sinter plant. Agglomerate said to be 55 - 60% iron at less than 5% moisture.

III. SYNOPSIS OF MEETINGS AND PLANT VISITS (continued)

C. May 22, 1975 - Zap-Sib Plant at Novo Kuznetsk in Siberia

A. A. Kugushin	- Plant Director
Y. V. Achmin	- Chief Energy Engineer
B. N. Maximov	
Ms. T. V. Shulepnikova	
V. O. Shevchuk	
U. S. Delgation	

Arrival at plant was delayed to 4:00 p.m. because of diversion of plane to alternate city. Nevertheless, the plant tour was conducted, as planned, continuing into the evening.

Zap-Sib is a new plant which began operation in 1960's. Will eventually produce 12,000,000 annual tons on a 900 hectare site. Is gradually displacing older plant on the other side of the city.

First visited coke plant dry quenching facility, serving two 5.5 meter, 65 oven batteries constructed in 1971-72 and rated at 55 tons/hour. Four of 6 batteries now operating are equipped to dry quench (also have wet quench). Observed and were given explanation of dry quench system.

Visited No. 2 BOF converter shop which has been in operation approximately 1 year and has 4,200,000 annual tons present capacity. Two vessels; 310 ton heats. Observed vessel charge and blow, then inspected scrubber water treatment recycle system. System is comprised of 4 radial sedimentation tanks and sludge treatment.

Also observed sinter plant sludge treatment system vacuum filter installation.

D. May 24, 1975 - Zhdanov Iliech Plant (Saturday)

Y. A. Zubkov	- Assistant Chief Energy Engineer
D. D. Myagkiy	- Chief of Donetsk branch of "VNIPI" Institute
B. N. Maximov	
V. O. Shevchuk	
U. S. Delegates	

Met first at plant office for discussion and introductions. It was indicated that the 7,300,000 ton Iliech plant has 22 recycle systems in conjunction with facilities for the production of:

- Sinter
- Iron
- BOF Steel
- Open Hearth Steel
- Hot and Cold Rolling



iii. SYNOPSIS OF MEETINGS AND PLANT VISITS (continued)

D. May 24 Plant Visit (continued)

Visited rather old converter shop with 3 at 130 ton BOP vessels, constructed 1964. Inspected BOP shop, gas cleaning system and water treatment facility. Typically, had 2 thickeners at 30 meters diameter each. Also typical, there was a battery of 32 forced draft cooling towers -- of which 2 were in use. Scrubber water volume was indicated to be 250 - 270 M<sup>3</sup>/hour. Sludge generation = 200 tons/day, dry weight.

E. May 26, 1975 - Makeyevka Kirov Plant

Y. A. Zubkov                      - Assistant Chief Engineer-Energy  
D. D. Myagkiy  
B. N. Maximov  
V. O. Shevchuk  
U. S. Delegates

Met first at plant office for greeting by Mr. Pelenov, Plant Director, introduction and discussion of the proposed program. Makeyevka plant has approximately 4,000,000 tons annual capacity. As near as could be ascertained they make structural products and wire rope. It was indicated that American guests had visited this plant twice before, for the purpose of discussing their blast furnace evaporative cooling installation.

The only facility visited was the open hearth, an 11 furnace 4,000,000 annual ton shop, which is the only steel production facility in the plant. Four (4) furnaces are equipped with round throat venturi scrubbers; six (6) furnaces are equipped with rectangular adjustable throat scrubbers and one furnace is uncontrolled.

Delegation was shown the scrubber installation and the waste heat boiler for one of the furnaces as well as the scrubber water treatment and recycle facilities. Again there were unused cooling towers. Water treatment facilities again consisted of two (2) radial thickeners, each 30 meters diameter -- which seems to be a universal Soviet design. It was stated that magnetic flocculation had been in use there since 1970 when the water treatment system was installed, and that this resulted in a more rapid sedimentation rate. We were not shown that equipment, however, and no comparative statistics were given.

Sludge from this facility is now being impounded, but it was indicated that a sludge drying-pelletizing installation similar to that observed at Lipetsk had been designed and would be installed.

E. May 26 Plant Visit (continued)

Although the delegation was only in Makeyevka briefly, elaborate preparations had been made for the Open Hearth visit. The areas visited were newly painted and spotless and the plant director was complimented accordingly. It was also a plant of interesting contrasts. Steam locomotives still being used quite extensively -- but the most modern office facilities seen on the expedition.

F. May 27, 1975 - Kharkov Institute "VNIPI Chermetenergoochistka"

A. I. Tolochko	- Institute Director
M. K. Semenov	- Assistant Chief Engineer on Water Purification Problems
G. E. Levin	- Chief of Water Purification Research
B. N. Maximov	
V. O. Shevchuk	
U. S. Delegation	

Two days of meetings were held here. Initially, the Institute was described and its functions were outlined. Formed in 1967, the Institute was said to now have some 2000 employees -- principally at Kharkov but also at branches at other locations and in small teams at main steel producing plants. The Institute is under the Iron and Steel Ministry and is responsible for design of air and water pollution control facilities for Iron and Steel plants and for facilities connected with utilization of secondary power resources. A separate division was said to be responsible for "adjustment" of air and water control equipment in the plants. The Institute is also involved in marketing and licensing of Soviet technology; notably, at this time, evaporative cooling for blast furnaces. Coke Plant pollution control technology is not handled here but is understood to be under the Coal Ministry. Of 2000 employees, it was indicated that 500 are engaged in Research, 1000 in design and the balance in maintenance and miscellaneous activities.

The following is a brief synopsis of our discussions with various Institute representatives

1. Water Standards

There are no effluent standards in Russia. There are only stream quality standards, (See attachment No. 1) which are set by public health authorities, who feel that no discharge should be permitted unless it meets these stream quality standards without dilution. It was also indicated that there was a temperature limit of 30 to 35°C in summer on discharge waters.

F. May 27 Meeting - Institute (continued)

1. Water Standards (continued)

The Institute specialists, however, could not understand why we do not in the USA have official standards for water to be recycled. They are engaged in developing such standards. There seemed to be great difficulty on their part agreeing that there could be latitude in such a standard according to local conditions at the consuming facility.

2. Objective of Zero Discharge

Main objective was stated to be the elimination of discharge, and the reduction of make-up to a level of 2 - 3% of the water in circulation.

Again, it was mentioned that 3 plants will be selected for the installation of zero discharge systems.

The concept they have in mind is that each operation will have its own integral recycle system. Fresh make-up water would go first to systems which require highest quality. Blowdown from those systems would cascade to lower quality systems until finally consumed in dust wetting, slag cooling, etc. Excess volume might have to be evaporated. Based on USA experience they have, in concept, vastly oversimplified the problems manifest in such a system of systems.

3. Storm Water

The Soviets stated that only now have they begun to consider the problem of treatment of storm runoff. It was said that modern plants there, and apparently some communities, have separate storm sewer systems which are, therefore, allowed to discharge direct to the stream.

4. State of the Art - Water Pollution Control

a. For BOP Converter and Open Hearth scrubber effluents.

Sedimentation in radial thickeners with recycle of overflow. Vacuum filtration, drying and pelletizing of sludge for recycle to the Sintering process. Again claimed their sludge did not contain zinc.

III. SYNOPSIS OF MEETINGS AND PLANT VISITS (continued)

F. May 27 Meeting (continued)

4. State of the Art (continued)

a. (continued)

Soviets inquired whether CO level in scrubber water from BOP OG systems has been a problem in U.S. They indicated it has been a problem for them. The delegation felt this might be aggravated by Soviet practice in many locations of installing thickeners, etc. inside buildings.

b. Hot Rolling Mill Wastes

Sedimentation in horizontal clarifiers, oil removal and recycle. Soviets claim that a majority of their plants (reference was believed to be to hot strip mills) now have recycle.

c. Pickling

All continuous pickle lines were said to use HCl and to regenerate WPL. Some batch pickling is sulfuric, and WPL is neutralized.

Neutralization of rinse waters and related sludge treatment was discussed at some length. Soviets did not seem to be aware of several techniques being used in the USA to concentrate sludges but did claim to be using pressure filtration.

Soviets also claimed to be using ion exchange technique, but later acknowledged this was only in laboratory demonstration stage.

d. Cold Mill Wastes

The Institute representatives discussed their role in designing a system for treating emulsified oils from cold rolling.

F. May 27 Meeting (continued)

5. State of the Art - Air Pollution Control  
(Mr. Drilinskiy joined session for this discussion.)

a. Blast Furnaces

Soviet furnaces have wet scrubbers. Claim to have pilot facility using metallic fabric filter cloth. Metal fabric is stainless, good for temperature to 700°C versus 400°C highest anticipated gas temperature.

b. Sinter Plants

Existing old plants have mechanical cyclone type devices which are being supplemented by wet scrubbers.

New sinter plants being installed with dry electrostatic precipitators, 1 stage.

c. Electric Furnaces

Same as USA direct furnace evacuation systems.

d. BOF Converters

Wet scrubbers, with no provision for treating fugitive emissions. Soviets say they are following USA and Japanese developments with interest.

e. Open Hearths

Generally dry systems (ESP) in North, wet scrubbers in South.

6. Protocol

Institute presented draft of proposed protocol (see Attachment No. 2 for final version.), which was discussed, revised and taken to Ministry at Moscow for final revision and signing.

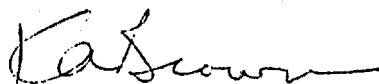
G. May 30, 1975 - Moscow - Iron and Steel Ministry

Same participants as original meetings except Mr. Petrikeyev away.

Protocol (attachment No. 2) was revised to final form and signed by A. Paretti for USA and by Yegorichev for USSR.

G. May 30, 1975 meeting (continued)

Institute personnel were hosts to USA delegation at a final dinner on May 30th.



K. A. Brown  
United States Steel Corporation

June 3, 1975

# Maximum admissible pollutant concentrations

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Item Nos.	Pollutant	Maximum admissible concentration, mg/l	
		economical, domestic and cultural purpose waters	fishing waters
1.	Benzene	0.5	0.5
2.	Nickel	0.1	0.01
3.	Nitrates	10.0	0.5
4.	Rhodañides	0.1	-
5.	Ferrous cyanides	1.25	-
6.	Fluor	1.5	-
7.	Cyanides	0.1	0.05
8.	Ammonia (as N)	2.0	0.05
9.	Zink ( $Zn^{2+}$ )	1.0	0.01
10.	Iron ( $Fe^{3+}$ )	0.5	-
11.	Copper ( $Cu^{2+}$ )	1.0	0.01
12.	Raw oil	0.3	0.05
13.	Penol	0.001	0.001
14.	Chrome ( $Cr^{6+}$ )	0.1	0.001
15.	Chrome ( $Cr^{3+}$ )	0.5	-
16.	Alkylsulphate	0.5	0.2

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P R O T O C O L

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of visit of US specialists from the Iron and Steel Industry to study methods of prevention of water pollution under Project II-2.I of the Environmental Agreement entitled "Prevention of water pollution from Industrial and Municipal Sources".

In accordance with the agreement between the Government of the United States of America and the Government of Soviet Socialist Republics on Cooperation in the Field of Environmental Protection (Moscow, May 23, 1972) and the protocol of the 1st Session of the Joint US-USSR Commission (Moscow, December, 1973) and Working Group (Chicago, USA, September 16-19, 1974), the USSR and the USA experts have met in the USSR during the period May, 17 to 31, 1975, to exchange experiences in the water pollution field and to visit iron and steel mills of the Soviet Union.

The Chairman of the US delegation was Mr. Andrew Pare, Senior Consultant in the Office of Water Program Operations of the Environmental Protection Agency.

The Chairman of the USSR group was V.I. Petrikeyev, the Deputy Minister of Energy Management of the USSR Iron and Steel Ministry.

A list of the members of the delegations is attached as Appendix I.

At meetings in Moscow, Lipetsk, Novo-Kuznetsk, Zhdanovskaya Makeevka and Kharkov the information obtained was discussed and opinions were exchanged as to the USSR and the USA achievements in the field of water protection for iron and steel production departments. General trends and methods for the prevention of water pollution in the iron and steel industry were reviewed.

Also attached as Appendix II is the Soviet proposal for furthering our program. The US side considers it necessary to review this Soviet proposal and to make recommendations. A Working group meeting in the USA, September, 1975.

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At the meetings it was agreed that the list of Soviet metallurgical experts making up the delegation to arrive September in the United States would be forwarded shortly.

Also any possible suggestions for visitations of mills in the USA and problems they want to discuss should be forwarded soon as possible. These will be considered and wherever practicable will be included in the itinerary.

During the visit of the Soviet delegation to the US a review of the Soviet proposals and US for further cooperation under environmental agreement for our iron and steel industries will be held.

The both groups state the meetings and visitations were held in an atmosphere of friendship, mutual understanding and cooperation. The chairman of the American delegation thanks Soviet hosts for their outstanding courtesies.

The protocol is signed on May, 30, 1975 in Moscow in Russian and English with both texts of the same validity.

V.I. Petrikeyev

Chairman of the USSR  
Delegation in the task  
force.  
Head of Power Services and  
Organizations Administration,  
Ministry of Iron & Steel  
Industry of the USSR

A. Paretti

Chairman of the USA  
Delegation in the task  
force.  
Consultant Water Program  
Operation, EPA

OF PARTICIPANTS OF THE WORKING MEETING

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The USA

A. Parotti	Consultant, Water Program Operations, EPA
K.A. Brown	Chief Staff Engineer, Air & Stream Pollution Control, United States Steel Corporation
L. Boehm	Engineering Supervisor, Armco Environmental Engineering, Armco Steel Corporation
J.R. Suitlas	Manager, Environmental Control Research and Development, National Steel Corporation
P.W. Diercks	Chemical Engineer, EPA

The USSR

Petrikeyev V.I.	Head of Power Services and Organizations Administration, Ministry of Iron & Steel Industry of the USSR
Yegorichev A.P.	Chief Engineer of Power Services and Organizations Administration, Ministry of Iron Steel Industry of the USSR
Dello A.A.	Chief of Department of Foreign Relations, Ministry of Iron & Steel Industry of the USSR
Shulepnikova T.V.	Chief of Protokol Department of Foreign Relations Department
Maximov B.N.	Chief Engineer of Power Services and Organizations Administration, Ministry of Iron Steel Industry of the USSR
Kolpakov S.V.	Director of the Novo-Lipetsk metallurgical plant

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Grislin R.M.	Chief Energy-engineer of the Novo-Lipetsk metallurgical plant
Kugushin A.A.	Director of the ZapSib metallurgical plant
Achmin Y.V.	Chief Energy-engineer of the Zap-Sib metallurgical plant
Sabodash L.V.	Chief Energy-engineer of Zdanov metallurgical plant named after Iliech
Zubkov Y.A.	Assistant of the Chief Energy-engineer of Makeevka metallurgical plant
Tolochko A.I.	Director of Institute "VNIPIChermetenergoochistka"
Semenov M.K.	Assistant of the Chief Engineer on Water purification problems, institute "VNIPIChermetenergoochistka"
Levin G.E.	Chief of Water purification department of institute "VNIPIChermetenergoochistka"
Shevchuk V.O.	Chief of designing department on water purification problems, institute "VNIPIChermetenergoochistka"
Myagkiy D.D.	Chief of department of Donetsk part of institute "VNIPIChermetenergoochistka"

List  
of water purification problems,  
the Soviet specialists are interested in

1. Treatment and reuse of waste waters from the gas cleaning systems of metallurgical units.
2. Water stabilization in closed water recirculation systems at metallurgical plants.
3. Treatment of hydrocarbon waste waters with oil content from rolling mills.
4. Treatment of pickling liquor and rinse waters of complicate composition in the process of pickling of ferro-alloyed steel and ferro alloys.
5. Utilization of ferric sludges.
6. Water-supplying systems with zero discharge.
7. Water supply limitations at metallurgical plants.

A. At Novo-Lipetsk Plant

1. Plant Service Water Intake and Recycle Pump House
2. Waste Water Treatment and Recycle Lagoons
3. Coke Plant Bio-Oxidation Waste Water Treatment Plant
4. 200 MM Hot Strip Mill
5. Hot Strip Mill Waste Water Treatment and Recycle System
6. No. 2 Converter Shop Sludge Dewatering, Drying and Pelletizing

B. At Novo-Kuznetsk, Zap-Sib Plant

1. Coke Dry Quenching Installation and Coke Oven Battery
2. Sinter Plant Waste Water Treatment and Sludge Dewatering Facilities
3. No. 2 Converter Shop

C. At Zhdanov, Iliech Plant

1. Converter Shop
2. Converter Shop Gas Cleaning Plant
3. Converter Shop Waste Water Treatment Facilities
4. One Plant Outfall

D. At Makeyevka, Kirov Plant

1. Open Hearth Shop
2. Open Hearth Gas Cleaning
3. Open Hearth Scrubber Water Treatment Facilities

1. B - 1 Section

Waste waters treatment and reutilization in metallurgical units gas cleaning systems.

1. General

Metallurgical units are supplied with water in closed cycles.

The waste waters are clarified in the USA and the USSR in various treatment equipment (horizontal, radial and vertical settling tanks) with and without coagulation.

Water is stabilized by means of phosphating, recarbonization and adding surfactants. Corrosion is prevented by water alkalization.

2. Purpose

Purpose is exchanging system studies, development and operation experience, technical specifications and information as to water pollution control methods. The exchange is expected to give final decision of problems which are common to the USSR and the USA and create the best water pollution control methods.

3. Volume

To achieve aim stated in the section the following should be effected:

B 1-1 "Development and study of treatment plants for waste waters from mechanical impurities with the throughput 2-3 times more than that of existing plants and treatment level of

Aim

To reduce areas for treatment plants, to increase treatment efficiency.

Cooperation

USA working group and USSR working group exchange documentation allowed for pilot and full-scale plants which should include:

- waste waters quality (water and sludge chemical composition, sludge particle size);
- treatment plants types;
- construction features and their influence on waste water treatment level and treatment plants efficiency;
- specific hydraulic loads,  $m^3/m^2$  hr with coagulation process and without;
- treatment level,  $m^3/m^2$  at optimum loads on treatment plants;
- types of coagulants and flocculants<sup>nts</sup> used, their quality and dosage, mg/l ( $g/m^3$ );
- promising trends for waste water treatment from mechanical impurities.

Date - 1977

2. Both groups experts will meet after receiving mutual information to estimate results obtained and to compile cooperation

3. While visiting: USA - by Soviet experts and USSR - by american experts the acquaintance with high efficient and high productive treatment plants is desired.

B - 1 - 2

Waste water stabilized treatment in recycle water supply systems of metallurgical enterprizes.

Aim. To preclude deposits and corrosion.

Cooperation

1. USA and USSR working groups exchange information and documentation allowed which should involve:

- description of stabilized treatment methods and waste waters quality;
- process stabilization performance quality;
- reagents dosage.

Date - 1978.

2. Both groups experts will meet after receiving mutual information to estimate results and to compile cooperation program.

Date - on mutual agreement.

II. B - 2 . Treatment of oil-scale containing waste waters of rolling mills (hot and cold rolling mills).

I. Generals

To treat lubricant and cooling liquid sedimentation, flotation and filtration



In the USSR radial settling tanks are used as sedimentation units as well as strainers and filters with floating bed for filtration.

In the USA the use of separators with ~~perforated~~ granular bed with throughput up to 600 m<sup>3</sup>/hr and rapid filters with high bed is of interest.

## 2. Aim

The aim consists in exchanging of investigation, development and system operation experiences, technical data and information on methods for prevention of water pollution with oils and for scale utilization.

The mutual exchange expected to result in final solution of common USA and USSR problems and development of optimum methods for prevention of water pollution with oil-scale containing waste waters.

## 3. Volume

To achieve aims the following should be carried out:

B - 2 - 1.

High efficient waste water descaling and deciling methods.

### Aim

*increase*  
rising of water treatment equipment throughput and efficiency

## Cooperation

1. The USA and USSR working groups exchange available documents about pilot and full-scale plants which are to include:

- waste water quality;

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- demanded treatment level;

- methods, equipment (and its features) for waste water decoiling and descaling (construction, throughput, efficiency);
  - deep bed filters and regeneration methods description.
- Date - 1978.

2. The USA and the USSR experts will consult as necessary. The USSR experts visit to filtering systems for waste water descaling and decoiling at the USA iron and steel works is desirable.

Date - 1976.

Section III. § -3.

Retreatment of pickling liquors and complex composition washing waters which arise while pickling high grade steels and alloys.

Generalis

The USA and the USSR use at present principally neutralization. As reagents lime, soda and ammonia are used depending on waste water composition and raw materials availability.

\* The USA Du Pont Company and the USSR have developed the method allowing to reduce environmental pollution danger to utilize sludge by means of obtaining crystal product magnetite while lime neutralization instead of poor ferrous hydroxide.

Aim

The aim is exchange of information on methods of pickling liquors and washing waters retreatment.

The mutual exchange is expected to result in final decision

Cooperation

1. Both the USA and the USSR working groups exchange available documentation which is to include:

- quantitative and qualitative characteristics of washing waters and waste pickling liquors;
- requirements to the cleaning level;
- acids regeneration methods;
- valuable substances utilization.

Date - 1977.

2. Both groups experts meet after receiving mutual information for evaluation results obtained and for making up cooperation program.

Date - on mutual agreement.

3. It is desirable to ~~get~~ acquaint ~~the~~ Soviet experts with Du Pont Company studies on waste pickling liquors and washing waters retreatment with partially dewatered sludge obtaining while visiting the USA.

IV. B - 4.

Iron-containing sludge utilization.

I. Generala

In the USA Aglomet (Chemical Recapture) Company has developed the technology and equipment for briquetting iron-containing dust by hot pressing method.

- 7 -

In the USSR methods of iron-containing sludges utilization with their dewatering on press-filters and centrifuges in sintering plant burden are developed and used.

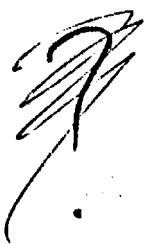
Studies on utilization of sludges arising while neutralizing pickling acid waste in agriculture and for production of building materials are carried out.

## 2. Aim

Rising of iron containing sludge utilization level.

### Cooperation

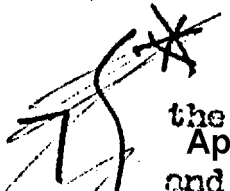
1. The USA and the USSR working groups exchange information which is to include the following:

- 
- methods of sludge and dust utilization;
  - operating parameters of equipment;
  - requirements to the quality of utilized sludges.

Date - 1977.

2. Both groups experts meet after getting mutual information for evaluating obtained data and making up the cooperation program.

Date - on mutual agreement.



3. It is desirable to get Soviet experts acquainted with the Aglomer (Chemical Recapture) Company studies and equipment for briquetting iron-containing dust by hot press

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desirable to get the American experts acquainted with  
sludge dewatering and utilization preparing units.

P R O T O C O L

of visit of US specialists from the Iron and Steel Industry to study methods of prevention of water pollution under Project II-2.I of the Environmental Agreement entitled "Prevention of water pollution from Industrial and Municipal Sources".

In accordance with the agreement between the Government of the United States of America and the Government of Soviet Socialist Republics on Cooperation in the Field of Environmental Protection (Moscow, May 23, 1972) and the protocol of the this Session of the Joint US-USSR Commission (Moscow, December, 1974) and Working Group (Chicago, USA, September 16-19, 1974), the USSR and the USA experts have met in the USSR during the period May, 17 to 31, 1975, to exchange experiences in the water pollution field and to visit iron and steel mills of the Soviet Union.

The Chairman of the US delegation was Mr. Andrew Paretti, Consultant in the Office of Water Program Operations of the US Environmental Protection Agency.

The Chairman of the USSR group was V.I. Petrikeyev, the Chief of Energy Management of the USSR Iron and Steel Ministry.

A list of the members of the delegations is attached as Appendix I.

At meetings in Moscow, Lipetsk, Novo-Kuznetsk, Zhdanov, Makeevka and Kharkov the information obtained was discussed and opinions were exchanged as to the USSR and the USA achievement in the field of water protection for iron and steel production departments. General trends and methods for the prevention of water pollution in the iron and steel industry were reviewed.

Also attached as Appendix II is the Soviet proposal for furthering our program. The US side considers it necessary to review this Soviet proposal and to make recommendation at the Working group meeting in the USA, September, 1975.

The USA team observed and discussed certain water treatment facilities at metallurgical works in Lipetsk, Novo-Kuznets Zhdanov and Makeevka. Discussions on water pollution problems were held at the institute "VNIPIChermetenergoochistka" in Khar'kov and the Ministry for Iron and Steel Industry in Moscow.

At the meetings it was agreed that the list of Soviet metallurgical experts making up the delegation to arrive September, 1975 in the United States would be forwarded shortly.

Also any possible suggestions for visitations of mills in the USA and problems they want to discuss should be forwarded as soon as possible. These will be considered and wherever practicable will be included in the itinerary.

During the visit of the Soviet delegation to the US a review of the Soviet proposals and US for further cooperation under the environmental agreement for our iron and steel industries will be held.

The both groups state the meetings and visitations were held in an atmosphere of friendship, mutual understanding and cooperation. The chairman of the American delegation thanks our Soviet hosts for their outstanding courtesies.

The protocol is signed on May, 30, 1975 in Moscow in Russian and English with both texts of the same validity.

V.I.Petrikeyev

Chairman of the USSR  
Delegation in the task  
force.  
Head of Power Services and  
Organizations Administration,  
Ministry of Iron & Steel  
Industry of the USSR

A. Paretti

Chairman of the USA  
Delegation in the task  
force.  
Consultant Water Program  
Operation, EPA

OF PARTICIPANTS OF THE WORKING MEETING  
OF THE USSR/US TASK FORCE

The USA

A.Paretti	Consultant, Water Program Operations, EPA
K.A.Brown	Chief Staff Engineer, Air & Stream Pollution Control, United States Steel Corporation
L.Boehm	Engineering Supervisor, Armco Environmental Engineering, Armco Steel Corporation
J.R.Suitlas	Manager, Environmental Control Research and Development, National Steel Corporation
P.W.Diercks	Chemical Engineer, EPA

The USSR

Petrikeyev V.I.	Head of Power Services and Organizations Administration, Ministry of Iron & Steel Industry of the USSR
Yegorichev A.P.	Chief Engineer of Power Services and Organizations Administration, Ministry of Iron & Steel Industry of the USSR
Dello A.A.	Chief of Department of Foreign Relations, Ministry of Iron & Steel Industry of the USSR
Shulepnikova T.V.	Chief of Protokol Department of Foreign Relations Department
Maximov B.N.	Chief Engineer of Power Services and Organizations Administration, Ministry of Iron & Steel Industry of the USSR
Kolpakov S.V.	Director of the Novo-Lipetsk metallurgical plant



Grizlin R.M.	Chief Energy-engineer of the Novo-Lipetsk metallurgical plant
Kugushin A.A.	Director of the ZapSib metallurgical plant
Achmin Y.V.	Chief Energy-engineer of the Zap-Sib metallurgical plant
Sabodash L.V.	Chief Energy-engineer of Zdanov metallurgical plant named after Il'ich
Zubkov Y.A.	Assistant of the Chief Energy-engineer of Makeevka metallurgical plant
Tolochko A.I.	Director of Institute "VNIPIChermetenergoochistka"
Semenov M.K.	Assistant of the Chief Engineer on Water purification problems, institute "VNIPIChermetenergoochistka"
Levin G.E.	Chief of Water purification department, institute "VNIPIChermetenergoochistka"
Shevchuk V.O.	Chief of designing department on water purification problems, institute "VNIPIChermetenergoochistka"
Myagkiy D.D.	Chief of department of Donetsk part of the institute "VNIPIChermetenergoochistka"

Appendix II

List  
of water purification problems,  
the Soviet specialists are interested in

1. Treatment and reuse of waste waters from the gas cleaning systems of metallurgical units.
2. Water stabilization in closed water recirculation systems at metallurgical plants.
3. Treatment of hydrocarbon waste waters with oil content from rolling mills.
4. Treatment of pickling liquor and rinse waters of complicate composition in the process of pickling of ferro-alloyed steels and ferro alloys.
5. Utilization of ferric sludges.
6. Water-supplying systems with zero discharge.
7. Water supply limitations at metallurgical plants.

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